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C-A OPERATIONS PROCEDURES MANUAL

2.5.1 Accelerator Safety Envelope Parameters for C-A Tandem Van de Graaff

Text Pages 2 through 7

Hand Processed Changes

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Approved: ***Signature on File*** _____
Collider-Accelerator Department Chairman Date

E. Lessard

2.5.1 Accelerator Safety Envelope Parameters for Tandem Van de Graaff

1. Purpose

1.1. This procedure assigns responsibility for maintaining the Accelerator Safety Envelope Parameters for the TVDG and TTB Facilities. These Parameters are based on the Accelerator Safety Envelope and any relevant USIs documented using C-A OPM 1.10.1, Unreviewed Safety Issues.

1.2. Implicit in the notion of an Accelerator Safety Envelope Parameter is that variations in operating conditions are permitted if and only if they do not exceed the defined boundaries. A variation beyond the boundaries described below shall be treated as a reportable occurrence. Notifications of occurrences shall be made according to C-A OPM 10.1.

2. Responsibilities

2.1. The C-A Department Chairman shall approve all changes to the Accelerator Safety Envelope Parameters (ASEPs).

2.2. The On-Duty Operator-in-charge is responsible for ASEPs in Steps 5.1.1, 5.2.1, 5.5.1 and 5.5.2.

2.3. The Liaison Physicist for the TVDG/TTB is responsible for the ASEPs in Steps 5.3.1 and 5.9.5.

2.4. The Operations Supervisor for the TVDG/TTB is responsible for the ASEPs in Steps 5.2.2, 5.8.1, 5.9.3, 5.9.4, 5.9.6 and 5.9.7.

2.5. The TVDG Mechanical Engineer is responsible for the ASEPs in Steps 5.6.1 and 5.7.1.

2.6. The C-A Access Controls Group Leader is responsible for the ASEPs in Step 5.4.1, 5.4.2, 5.4.3, 5.9.1 and 5.9.2.

2.7. The C-A Department Radiation Safety Committee is responsible for the ASEP in Step 5.1.2.

3. Prerequisites

None

4. Precautions

None

5. Procedure

Accelerator Safety Envelope Parameters are established for:

- TVDG and TTB Beam Limits
- Control of Beam Loss
- Classification of Radiological Areas
- Access Controls During Operations With Beam
- Fire Protection
- Handling and Alerting System for Insulating Gas
- Column Truss Structures
- Staffing
- Calibration, Testing, Maintenance, and Inspection

5.1 TVDG and TTB Beam Limits

5.1.1 The on-duty TVDG Operator in charge shall maintain the limit on the beam extracted from the TVDG or injected into the TTB shall be such that exposure to individuals in uncontrolled areas is likely to be less than 25 mrem in one year. For example, in the case of deuteron losses with 3 feet of earth shielding over the TTB tunnel, an uncontrolled area is maintained for 12 MeV deuterons with a pulsed-beam average-current less than 200 nA.

5.1.2 Beam limits for specific ions shall be proscribed in terms of beam energy and intensity, before operations with the specific ion, by the C-A Department Radiation Safety Committee in order to meet the requirement in 5.1.1.

5.2 Control of Beam Loss

5.2.1 The on-duty TVDG Operator in charge shall routinely interpret loss monitoring results and RCT radiation survey results in order to maintain beam loss "As Low As Reasonably Achievable" as defined in the BNL Radiological Control Manual.

5.2.2 When applicable, the Operations Supervisor for the TVDG shall provide the TVDG Operator in charge with procedures that will control beam loss as follows:

5.2.2.1 The Operations Supervisor for the TVDG/TTB shall not allow beam-loss induced radiation within TVDG/TTB uncontrolled areas to be greater than 0.5 mrem in an hour and for repeated losses greater than 25 mrem in a year.

5.2.2.2 The Operations Supervisor for the TVDG/TTB shall not allow beam-loss induced radiation within TVDG/TTB Controlled Areas to be greater than 5 mrem in an hour and for repeated losses greater than 100 mrem in a year.

5.3 Classification of Radiological Areas

5.3.1 The Liaison Physicist for the TVDG/TTB shall ensure changes to radiological area classifications are in accord with the requirements in the BNL Radiological Control Manual.

5.4 Access Controls During Operations With Beam

5.4.1 The Access Controls Group Leader shall ensure that safety-system configuration control and maintenance shall be in accordance with C-A OPM 4.91.

5.4.2 The Access Controls Group Leader shall ensure that area radiation monitors that are interfaced with the Access Controls System are within their calibration date.

5.4.3 The Access Controls Group Leader shall ensure that the locations of area radiation monitors are maintained as defined by the C-A Radiation Safety Committee.

5.5 Fire Protection

5.5.1 The On-Duty Operator in charge shall take appropriate action if fire detection/protection systems are impaired. These actions may either be to prohibit personnel from working in a specific area, and/or to de-energize equipment.

5.5.2 The On-Duty Operator in charge shall allow TVDG/TTB magnets and power supplies to be energized if the smoke detection system for the energized area can transmit an alarm to summon the Fire/Rescue Group. Transmittal may be automatic or via a fire watch.

5.6 Handling and Alerting System for Insulating Gas

5.6.1 The TVDG Mechanical Engineer shall ensure the following:

5.6.1.1 TVDG accelerator tanks - The absolute maximum allowable working pressure for these vessels is 300 psig, as per ASME Code Stamp on the vessel.

5.6.1.2 The maximum working pressure for the insulating-gas storage-tanks is 575 psig.

5.6.1.3 The minimum allowable ambient temperature for the insulating-gas storage-tanks location is 32 ^{0}F.

5.6.1.4 The maximum working pressures for these vessels are:

5.6.1.4.1 Heat Exchangers: 250 psig @ 300 ^{0}F

5.6.1.4.2 Dryer Towers: 250 psig @ 450 ^{0}F, 450 psig @ 250 ^{0}F

5.6.1.4.3 Filter Towers: 250 psig @ 100 ^{0}F

5.6.1.5 Oxygen monitors are used to alert against displacement of oxygen by insulating gas leaking into occupied areas alarm for oxygen levels below 19.5%.

5.7 Column Truss Structures

5.7.1 The TVDG Mechanical Engineer shall ensure the following:

5.7.1.1 For MP6, the maximum additional column load that may be added to the original configuration is 5000 pounds or less concentrated at the high voltage terminal.

5.7.1.2 For MP7, the maximum additional column load that may be added to the original configuration is 3000 pounds concentrated or less at the high voltage terminal.

5.8 Staffing

5.8.1 The Operations Supervisor shall ensure an adequate number of qualified personnel in the TVDG Control Room. Two qualified individuals are required for operation of the MP6 and/or MP7 Tandem accelerators. The Operator-in-charge must be fully qualified and must be on-duty at the TVDG facility. The second operator is a person who is judged by the Pre-Injector Group Leader and TVDG Operations Supervisor, or in their

absence the TVDG Operations Shift Supervisor, to have sufficient knowledge to assist the Operator-in charge. The second operator must be on-duty at the C-A Complex and must have radio communication with the on-duty Operator-in-charge at the TVDG.

5.9 Calibration, Testing, Maintenance, and Inspection

5.9.1 The Access Controls Group Leader shall ensure the interlocks for radiation safety are functionally tested according to the requirements in BNL RadCon Manual, Chapter 3, Appendix 3A.

5.9.2 The Access Controls Group Leader shall ensure the area radiation monitors undergo annual testing (not to exceed 15 months).

5.9.3 The Operations Supervisor for the TVDG/TTB shall ensure the accelerator building ventilation exhaust fans undergo annual testing (not to exceed 15 months).

5.9.4 The Operations Supervisor for the TVDG/TTB shall ensure fire protection systems undergo annual testing (not to exceed 15 months).

5.9.5 The Liaison Physicist for the TVDG/TTB shall ensure radiological barriers undergo annual visual inspection (not to exceed 15 months).

5.9.6 The Operations Supervisor shall ensure the insulating gas handling system shall undergo annual inspection and testing (not to exceed 15 months).

5.9.7 The Operations Supervisor for the TVDG/TTB shall ensure the oxygen monitoring system shall undergo annual inspection and testing (not to exceed 15 months).

6. Documentation

None

7. References

7.1 TVDG SAD

7.2 TTB SAR

7.3 Accelerator Safety Envelope for TVDG/TTB

7.4 BNL RadCon Manual

7.5 C-A-OPM 1.10.1, “Procedure for Documenting Unreviewed Safety Issues”.

7.6 C-A-OPM 4.91, “Configuration Management Plan for the C-A Access Controls System”.

7.7 C-A-OPM 10.1, “Occurrence Reporting and Processing of Operations Information”.

8. Attachments

None